

## INDEX BASED CROP INSURANCE IN SENEGAL AND WEST AFRICA: SOME CONCERNS BASED ON ON-GOING EXPERIMENTS

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### SUMMARY:

Agricultural insurance is just starting in West Africa (WA) with the recent launching of some index based insurance pilot projects. However it is already possible to stress some important issues based on those experiments and also considering previous knowledge on climate and agriculture in WA. As regards climate issues, the main problem is the basis risk due to the huge spatio-temporal variability of rainfall. This reality pleads for the development of remote sensing methods. Other important issues are the local rainfall gradients and the recent trend of increasing rainfall. Climatic issues also stress the question of the fair management of level of protection and cost of premium. The only way to ensure equity between farmers is to use subsidies of different values in order to provide the same protection for the same price to all farmers. That is the case in Senegal but it is the only country where Government provides subsidies for insurance. But the main issue to be solved will be to find an acceptable solution with all the stakeholders to the trade-off between “protection” and “premium cost”. While people in Mali and Burkina Faso have accepted so far to buy very cheap insurance policies, without knowing how they protect them, we faced a totally opposite situation in Senegal where farmers' organizations analysed the indices in detail and asked for good protection at a low price. Major efforts will be necessary everywhere to allow stakeholders to analyse insurance issues together and decide which kind of system will be more appropriate.

### 1. INTRODUCTION

Agricultural insurance is just starting in West Africa (WA) with the recent launching of some index based insurance pilot projects, in Mali (cotton, corn), Burkina Faso (cotton, corn), Benin (corn) and Senegal (groundnut, corn). In those insurance systems yield losses are not directly measured in the fields of insured farmers but indirectly assessed through the value of an index, i.e. a mathematical equation or model, which uses reference measured parameters such as for instance rainfall or other climatic variables or official regional statistical yields (World Bank 2009, Hazell et al 2010). Although projects started very recently (2011 and 2012), it is already possible to stress some important issues based on the on-going experiments, also considering previous knowledge on climate and agriculture in WA. We will focus here on rainfall index based insurance.

### 2. HOW TO DEAL WITH CLIMATE FEATURES

The main feature of the climate in Sudano-Sahelian areas is the huge spatio-temporal variability of rainfall, probably the largest in the world. Farmers are very aware about that. As a consequence basis risk probability is important for rainfall based insurance. That is the main concerns for index insurance development.

Remote sensing technologies seem logically to be the solution to cope with this problem since they potentially allow assessing weather data and crop situation everywhere,

depending of course on pixels size. They appear also to be the solution for index based insurance extension since it seems unrealistic to install meteorological equipment everywhere. Yet, even with those techniques, basis risk is not totally eliminated since data are assessed as an average at pixel level. Moreover, the accuracy of those technologies must be assessed and improved. Approaches including both remote sensing and ground observations will probably be the good ones. In Senegal pilot projects are based on rainfall: a quite dense network of automatic raingauges network was installed in the project area around Nioro. In the other countries index data are dekadal relative evapotranspiration assessed from METEOSAT<sup>1</sup> information.

An important issue is that rainfall underwent a marked increase in WA over the last 15 years (figure 1), and farmers are well aware of it. This observation raises the question of which historical series of data must be considered to calibrate insurance systems? Considering a classical 30 years data time series seems not to be fair for farmers. For instance, in Senegal, the cost of the premium of an insurance system varies from 14000 FCFA<sup>2</sup> when considering only the last 15 years to calibrate it, to 20000 FCFA when considering the last 30 years. But who knows what will be the rainfall pattern of the next 10 years?

1 <http://www.esa.int/SPECIALS/MSG/>

2 The CFA franc is the Euro-backed currency of several WA countries. At the end of 2012, the exchange rate is about 500 FCFA to the US\$, 656 FCFA to the Euro.

Another important issue is the South-North gradient of precipitation in WA. It can be very steep in some places: for instance 130 mm in 25 km in the area of Nioro in Senegal. The question is: what kind of zoning is the most appropriate to handle gradients? Yet it is not possible to calibrate specific parameters for index based systems for all sites within a same agricultural region, nor for each pixel of a grid. This will be time consuming, expensive to solve and to manage and not easy to explain to farmers. In the Nioro area we divided the region in two and considered for each zone a reference station located in the North, i.e. in the drier part of each zone (figure 2).

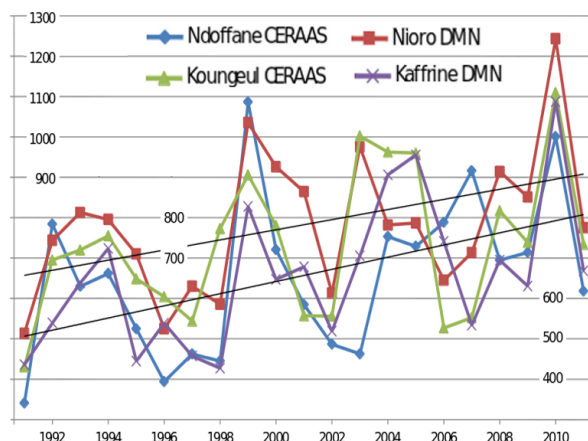


Figure 1: evolution of annual rainfall (mm) in the centre of Senegal on the 1990-2011 period. The trend lines correspond to Nioro (top) and Kaffrine (bottom); they show an annual rainfall increase close to about 150 mm in just ten years.

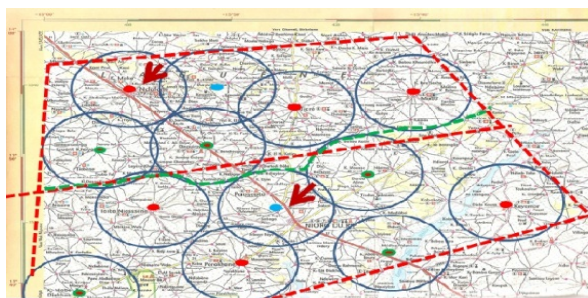


Figure 2: subdivision of Nioro-Ndofane region into two sub-zones. Red arrows indicate reference sites used to calibrate parameters of indexes. Coloured points indicate reference automatic raingauges installed for the insurance project and circles indicate areas covered by raingauges

Last but not least, the issues just mentioned also pose the question of the fair management of protection and premium within and area: the same level of protection will be costed differently according to rainfall features (premiums will be more expensive when going north). Thus, the choice is between selling insurance contracts having the same premium, but offering less protection to the farmers in the northern sites, or selling insurance contracts offering the

same protection but being more expensive in the northern latitudes. This is a very critical point. The only way to manage it with equity between farmers is to use subsidies of different values thanks to which the same level of protection is obtained for the same price by farmers. That is the way things have been managed in Senegal where the Government gives more subsidies in the north. Up to now Senegal is the only WA country where Government provides subsidies for insurance.

Another complex question will raise in the future: how to integrate climatic forecasts in insurance systems?

### 3. HOW TO SOLVE THE TRADE-OFFS BETWEEN LEVEL OF PROTECTION AND COST OF PREMIUM

The farmers who invest in their crops, using purchased inputs (fertilizer, improved seeds), and aim at earning money from their production, are the only ones who could be interested in paying for insurance. Moreover crop insurance can correctly develop only if the other development factors (credit, access to inputs, technical support) are well functioning. Yet the role of insurance is only to manage the non-controllable risks. Thus insurance seems to be compatible only with a certain level of intensification, trade circuit and general organization where ideally all the stakeholders work together in an intelligent way.

In Senegal farmers have shown interest for insurance because they consider that insurance will help them to have easier access to credit and to improve credit conditions: by securing their credit and protecting them in the bad years, by strengthening credit systems and by contributing to credit rate decreases and general credit development. That is the hope of farmers and other stakeholders such as farmers' organizations, banks and credit institutions.

Senegalese farmers also appeared to be very professional and curious about index based insurance. In focus groups and meetings, farmers always asked very precise questions such as: will index take into account rainfall distribution over crop phases? Where will reference raingauges be installed (they are aware of rainfall variability and understand basis risk issue)? How will their fields be linked to reference raingauges? What about other hazards than drought? How will credit and insurance be linked? When to pay premiums? Will insurance premiums decrease after a few years if there was no indemnification? Is it safe to trust the Insurance Company? What will be the cost?

Thus it can be said that actors are very professional and this must be considered as a very positive and favourable context for insurance development.

However, the main farmers' organizations didn't accept yet the index insurance we proposed since they consider (1) it

will offer insufficient protection to the farmers and (2) it is too expensive even considering subsidies! Obviously they are in their role when they defend farmers' interests, but it has been difficult so far to find a solution to this situation. Stakeholders must understand that due to large risks probabilities it will be impossible, even considering subsidies, to offer a significant level of protection for a low price.

Thus, additional work is still necessary in Senegal to allow all stakeholders to jointly analyse insurance issues and decide which kind of system will be more appropriate.

In Mali, Burkina Faso and Benin situations have been totally different so far. Farmers and other stakeholders have accepted insurances systems elaborated by Planet Guarantee (PG<sup>3</sup>) despite the fact that they are based on remote sensing data which nobody can understand, and despite not knowing in detail how they protect them. Moreover, since the developed indices are based on a pure statistical approach, they are not calibrated according to crop status and/or yields losses, they don't take in account sensitive phases of the crops, and they also induce unfair differences in protection level between areas.

But PG succeeded in selling thousands of contracts. The first reason is that premiums were very low (since they offer low protection). The second reason is the ability and "commercial skill" of PG. The third one is the large demand of credit of the farmers. As a matter of fact farmers explain that "*they trust their credit institution*" and credit institutions explain that "*they trust PG and insurance companies*". We personally doubt that this "kind of black-box" system will be sustainable in the long run.

These two opposite situations stress the problem of the prevalence of drought in Sudano-Sahelian areas and the difficulty to develop insurance in such a context. The key question is how to solve the trade-off between "protection" and "cost of premium". The Senegal experience indicates that serious stakeholders of the agricultural sector will not easily accept insurance.

#### 4. FIRST CONCLUSIONS

The main problem is the basis risk due to the huge spatio-temporal variability of precipitation. This reality leads for the development of remote sensing methods, probably coupled with ground measurements (rainfall and yields). Other important climatic issues are (1) local rainfall gradients, which raise the question of the zoning approach and (2) the recent upward trend of rainfall, which must normally also be considered.

The climatic issues also raise the question of the fair management of protection and premium; the only way to manage this very critical question fairly between farmers is to use differential subsidies in order to provide the same

protection for the same price to all farmers. This is the case in Senegal, but Senegal is the only country where Government provides subsidies for insurance.

The other main issue to be solved will be to find pertinent solution with all the stakeholders to the trade-off between "protection" and "premium cost". People in Mali and Burkina have accepted so far to buy very cheap insurances, without knowing how they protect them. We faced the opposite situation in Senegal where farmers' organizations analysed indices in detail and asked for good protection for a low price.

A lot of work will be necessary everywhere to allow stakeholders to analyse insurance issues and jointly decide which kind of system will be more appropriate.

Our hypothesis is that in the future insurance systems will probably be calibrated to protect only against severe climatic hazards, in order to stabilize credit systems while remaining affordable. Moreover, we also consider that insurance systems should focus on global portfolios of credit institutions, without being managed at farmers' level.

#### 5. REFERENCES

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3 <http://www.planetguarantee.com/>